DV qualifiers in database -HR

checked by MT 2/3/17

CETIFICATION

SDG No: MC49177
Site: BMS, Building 5 Area, PR Humacao, PR
Laboratory: Accutest, Massachusetts
Matrix: Groundwater

SUMMARY: Groundwater samples (Table 1) were collected on the BMSMC facility – Building 5 Area. The BMSMC facility is located in Humacao, PR. Samples were collected December 13 - 15, 2016 and were analyzed in Accutest Laboratory of Marlborough, Massachusetts that reported the data under SDG No.: MC49177. Results were validated using the following quality control criteria of the methods employed (MADEP VPH and MAPED EPH, Massachusets Department of Environmental Protection, 2004) and the latest validation guidelines (July, 2015) of the EPA Hazardous Waste Support Section. The analyses performed are shown in Table 1. Individual data review worksheets are enclosed for each target analyte group. The data sample organic data samples summary form shows for analytes results that were qualified.

In summary the results are valid and can be used for decision taking purposes.

Table 1. Samples analyzed and analysis performed

SAMPLE ID	SAMPLE DESCRIPTION	MATRIX	ANALYSIS PERFORMED
MC49177-1	G-IR3	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-2	EB121416	AQ – Equipment Blank	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-3	MW-21S	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-3D	MW-21S MSD	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-3S	MW-21S MS	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-4	FB121316	Field Blank Water	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-5	S-43S	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-6	S-42S	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-7	E-1R	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-8	D-1R	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-9	D-1R DUP	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-10	MW-13	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-11	MW-7	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges

SAMPLE ID	SAMPLE DESCRIPTION	MATRIX	ANALYSIS PERFORMED
MC49177-12	FB121416	Field Blank Water	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-13	MW-22S	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-14	EB121516	AQ – Equipment Blank	Volatiles TPHC Ranges Extractable TPHC Ranges

Reviewer Name: Rafael Infante
Chemist License 1888

Signature: Rafael Infante

Date: January 21, 2017

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Report of Analysis

Client Sample ID:	G-1R3		
Lab Sample ID:	MC49177-1	Date Sampled:	12/13/16
Matrix:	AQ - Ground Water	Date Received:	12/16/16
Method:	MADEP VPH REV 1.1	Percent Solids:	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78373.D	1	12/20/16	AF	n/a	n/a	GWX3883
Run #2	WX78374.D	100	12/20/16	AF	n/a	n/a	GWX3883

	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	161	50	8.8	ug/l	
	C9- C12 Aliphatics (Unadj.)	85000 [a]	5000	800	ug/l	
	C9- C10 Aromatics (Unadj.)	151	50	9.7	ug/l	
	C5- C8 Aliphatics	85.5	50	8.8	ug/l	
	C9- C12 Aliphatics	17800	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	95%	83%	70-130%
	2,3,4-Trifluorotoluene	105%	92%	70-130%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: DE16551.D DE16579.D

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Report of Analysis

Client Sample ID:	G-1R3		
Lab Sample ID:	MC49177-1	Date Sampled:	12/13/16
Matrix:	AQ - Ground Water	Date Received:	12/16/16
Method:	MADEP EPH REV 1.1 SW846 3510C	Percent Solids:	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16551.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2 [a]	DE16579.D	1	01/03/17	TA	12/27/16	OP49325	GDE925

	Initial Volume	Final Volume
Run #1	930 ml	2.0 ml
Run #2	930 ml	2.0 ml

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	49.8	110	31	ug/l	J
	C9-C18 Aliphatics	ND	110	18	ug/l	
	C19-C36 Aliphatics	71.8	110	29	ug/l	J
	C11-C22 Aromatics	48.8	110	31	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	80%	63%	40-140%
321-60-8	2-Fluorobiphenyl	99%	79%	40-140%
3386-33-2	1-Chlorooctadecane	35% [b]	33% [b]	40-140%
580-13-2	2-Bromonaphthalene	101%	80%	40-140%

(a) Confirmation run.
(b) Outside control limits due to possible matrix interference. Confirmed by refractionation/reanalysis.

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Manuel Infante Méndez
IC # 1888

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	EB121416		
Lab Sample ID:	MC49177-2	Date Sampled:	12/14/16
Matrix:	AQ - Equipment Blank	Date Received:	12/16/16
Method:	MADEP VPH REV 1.1	Percent Solids:	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78387.D	1	12/20/16	AF	n/a	n/a	GWX3883
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	ND	50	8.8	ug/l	
	C9- C12 Aliphatics (Unadj.)	10.1	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	14.5	50	9.7	ug/l	JB
	C5- C8 Aliphatics	ND	50	8.8	ug/l	
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	81%		70-130%
	2,3,4-Trifluorotoluene	91%		70-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	EB121416		
Lab Sample ID:	MC49177-2	Date Sampled:	12/14/16
Matrix:	AQ - Equipment Blank	Date Received:	12/16/16
Method:	MADEP EPH REV 1.1 SW846 3510C	Percent Solids:	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16552.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2 [a]	DE16580.D	1	01/03/17	TA	12/27/16	OP49325	GDE925

	Initial Volume	Final Volume
Run #1	880 ml	2.0 ml
Run #2	880 ml	2.0 ml

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	ND	110	33	ug/l	
	C9-C18 Aliphatics	ND	110	19	ug/l	
	C19-C36 Aliphatics	ND	110	31	ug/l	
	C11-C22 Aromatics	ND	110	33	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	87%	85%	40-140%
321-60-8	2-Fluorobiphenyl	108%	104%	40-140%
3386-33-2	1-Chlorooctadecane	32% [b]	33% [b]	40-140%
580-13-2	2-Bromonaphthalene	110%	105%	40-140%

(a) Confirmation run.
(b) Outside control limits .Sample results confirmed by re-fractionation/reanalysis.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	MW-21S		
Lab Sample ID:	MC49177-3	Date Sampled:	12/14/16
Matrix:	AQ - Ground Water	Date Received:	12/16/16
Method:	MADEP VPH REV 1.1	Percent Solids:	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78369.D	1	12/20/16	AF	n/a	n/a	GWX3883
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	ND	50	8.8	ug/l	
	C9- C12 Aliphatics (Unadj.)	12.8	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	14.8	50	9.7	ug/l	JB
	C5- C8 Aliphatics	ND	50	8.8	ug/l	
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	85%		70-130%
	2,3,4-Trifluorotoluene	91%		70-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	MW-21S		
Lab Sample ID:	MC49177-3	Date Sampled:	12/14/16
Matrix:	AQ - Ground Water	Date Received:	12/16/16
Method:	MADEP EPH REV 1.1 SW846 3510C	Percent Solids:	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16553.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2 [a]	DE16581.D	1	01/03/17	TA	12/27/16	OP49325	GDE925

	Initial Volume	Final Volume
Run #1	950 ml	2.0 ml
Run #2	950 ml	2.0 ml

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	41.1	110	30	ug/l	J
	C9-C18 Aliphatics	ND	110	18	ug/l	
	C19-C36 Aliphatics	ND	110	29	ug/l	
	C11-C22 Aromatics	40.4	110	30	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	77%	64%	40-140%
321-60-8	2-Fluorobiphenyl	97%	84%	40-140%
3386-33-2	1-Chlorooctadecane	26% [b]	29% [b]	40-140%
580-13-2	2-Bromonaphthalene	97%	85%	40-140%

(a) Confirmation run.
(b) Outside control limits due to possible matrix interference. Confirmed by refractionation/reanalysis.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	FB121316		
Lab Sample ID:	MC49177-4	Date Sampled:	12/13/16
Matrix:	AQ - Field Blank Water	Date Received:	12/16/16
Method:	MADEP VPH REV 1.1	Percent Solids:	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78388.D	1	12/20/16	AF	n/a	n/a	GWX3883
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	ND	50	8.8	ug/l	
	C9- C12 Aliphatics (Unadj.)	9.2	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	12.8	50	9.7	ug/l	JB
	C5- C8 Aliphatics	ND	50	8.8	ug/l	
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	80%		70-130%
	2,3,4-Trifluorotoluene	93%		70-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	FB121316		
Lab Sample ID:	MC49177-4	Date Sampled:	12/13/16
Matrix:	AQ - Field Blank Water	Date Received:	12/16/16
Method:	MADEP EPH REV 1.1 SW846 3510C	Percent Solids:	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16554.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2 [a]	DE16582.D	1	01/03/17	TA	12/27/16	OP49325	GDE925

	Initial Volume	Final Volume
Run #1	900 ml	2.0 ml
Run #2	900 ml	2.0 ml

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	ND	110	32	ug/l	
	C9-C18 Aliphatics	ND	110	19	ug/l	
	C19-C36 Aliphatics	ND	110	30	ug/l	
	C11-C22 Aromatics	ND	110	32	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	84%	70%	40-140%
321-60-8	2-Fluorobiphenyl	95%	81%	40-140%
3386-33-2	1-Chlorooctadecane	29% [b]	34% [b]	40-140%
580-13-2	2-Bromonaphthalene	96%	82%	40-140%

(a) Confirmation run.
(b) Outside control limits .Sample results confirmed by re-fractionation/reanalysis.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	S-43S		
Lab Sample ID:	MC49177-5	Date Sampled:	12/15/16
Matrix:	AQ - Ground Water	Date Received:	12/16/16
Method:	MADEP VPH REV 1.1	Percent Solids:	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78379.D	1	12/20/16	AF	n/a	n/a	GWX3883
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	42.9	50	8.8	ug/l	J
	C9- C12 Aliphatics (Unadj.)	59.5	50	8.0	ug/l	B
	C9- C10 Aromatics (Unadj.)	29.7	50	9.7	ug/l	JB
	C5- C8 Aliphatics	31.4	50	8.8	ug/l	J
	C9- C12 Aliphatics	27.3	50	8.0	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	81%		70-130%
	2,3,4-Trifluorotoluene	94%		70-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	S-43S		
Lab Sample ID:	MC49177-5	Date Sampled:	12/15/16
Matrix:	AQ - Ground Water	Date Received:	12/16/16
Method:	MADEP EPH REV 1.1 SW846 3510C	Percent Solids:	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16555.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2 [a]	DE16583.D	1	01/03/17	TA	12/27/16	OP49325	GDE925

	Initial Volume	Final Volume
Run #1	940 ml	2.0 ml
Run #2	940 ml	2.0 ml

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	80.6	110	30	ug/l	J
	C9-C18 Aliphatics	ND	110	18	ug/l	
	C19-C36 Aliphatics	ND	110	29	ug/l	
	C11-C22 Aromatics	77.7	110	30	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	89%	82%	40-140%
321-60-8	2-Fluorobiphenyl	93%	88%	40-140%
3386-33-2	1-Chlorooctadecane	38% [b]	38% [b]	40-140%
580-13-2	2-Bromonaphthalene	95%	89%	40-140%

(a) Confirmation run.
(b) Outside control limits due to possible matrix interference. Confirmed by refractionation/reanalysis.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: WX78380.D

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Report of Analysis

Client Sample ID:	S-42S		
Lab Sample ID:	MC49177-6	Date Sampled:	12/15/16
Matrix:	AQ - Ground Water	Date Received:	12/16/16
Method:	MADEP VPH REV 1.1	Percent Solids:	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78380.D	1	12/20/16	AF	n/a	n/a	GWX3883
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	15.8	50	8.8	ug/l	J
	C9- C12 Aliphatics (Unadj.)	14.4	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	13.9	50	9.7	ug/l	JB
	C5- C8 Aliphatics	15.3	50	8.8	ug/l	J
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	82%		70-130%
	2,3,4-Trifluorotoluene	94%		70-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	S-42S		
Lab Sample ID:	MC49177-6	Date Sampled:	12/15/16
Matrix:	AQ - Ground Water	Date Received:	12/16/16
Method:	MADEP EPH REV 1.1 SW846 3510C	Percent Solids:	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16556.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2 [a]	DE16584.D	1	01/03/17	TA	12/27/16	OP49325	GDE925

	Initial Volume	Final Volume
Run #1	930 ml	2.0 ml
Run #2	930 ml	2.0 ml

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	57.3	110	31	ug/l	J
	C9-C18 Aliphatics	ND	110	18	ug/l	
	C19-C36 Aliphatics	31.3	110	29	ug/l	J
	C11-C22 Aromatics	57.3	110	31	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	74%	69%	40-140%
321-60-8	2-Fluorobiphenyl	88%	84%	40-140%
3386-33-2	1-Chlorooctadecane	34% [b]	35% [b]	40-140%
580-13-2	2-Bromonaphthalene	89%	84%	40-140%

(a) Confirmation run.
(b) Outside control limits due to possible matrix interference. Confirmed by refractionation/reanalysis.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	E-1R		
Lab Sample ID:	MC49177-7	Date Sampled:	12/13/16
Matrix:	AQ - Ground Water	Date Received:	12/16/16
Method:	MADEP VPH REV 1.1	Percent Solids:	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78381.D	1	12/20/16	AF	n/a	n/a	GWX3883
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	23.6	50	8.8	ug/l	J
	C9- C12 Aliphatics (Unadj.)	17.9	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	13.1	50	9.7	ug/l	JB
	C5- C8 Aliphatics	14.5	50	8.8	ug/l	J
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	81%		70-130%
	2,3,4-Trifluorotoluene	89%		70-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Client Sample ID:	E-1R		
Lab Sample ID:	MC49177-7	Date Sampled:	12/13/16
Matrix:	AQ - Ground Water	Date Received:	12/16/16
Method:	MADEP EPH REV 1.1 SW846 3510C	Percent Solids:	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16557.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2 [a]	DE16585.D	1	01/03/17	TA	12/27/16	OP49325	GDE925

	Initial Volume	Final Volume
Run #1	980 ml	2.0 ml
Run #2	980 ml	2.0 ml

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	98.2	100	29	ug/l	J
	C9-C18 Aliphatics	ND	100	17	ug/l	
	C19-C36 Aliphatics	ND	100	28	ug/l	
	C11-C22 Aromatics	63.5	100	29	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	72%	77%	40-140%
321-60-8	2-Fluorobiphenyl	85%	94%	40-140%
3386-33-2	1-Chlorooctadecane	30% [b]	38% [b]	40-140%
580-13-2	2-Bromonaphthalene	86%	96%	40-140%

(a) Confirmation run.
(b) Outside control limits due to possible matrix interference. Confirmed by refractionation/reanalysis.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	D-1R		
Lab Sample ID:	MC49177-8	Date Sampled:	12/13/16
Matrix:	AQ - Ground Water	Date Received:	12/16/16
Method:	MADEP VPH REV 1.1	Percent Solids:	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78382.D	1	12/20/16	AF	n/a	n/a	GWX3883
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	11.1	50	8.8	ug/l	J
	C9- C12 Aliphatics (Unadj.)	16.2	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	16.0	50	9.7	ug/l	JB
	C5- C8 Aliphatics	ND	50	8.8	ug/l	
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	81%		70-130%
	2,3,4-Trifluorotoluene	92%		70-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: DE16558.D DE16590.D

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Client Sample ID:	D-1R		
Lab Sample ID:	MC49177-8	**Date Sampled:**	12/13/16
Matrix:	AQ - Ground Water	**Date Received:**	12/16/16
Method:	MADEP EPH REV 1.1 SW846 3510C	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16558.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2 [a]	DE16590.D	1	01/03/17	TA	12/27/16	OP49325	GDE925

	Initial Volume	Final Volume
Run #1	980 ml	2.0 ml
Run #2	980 ml	2.0 ml

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	36.6	100	29	ug/l	J
	C9-C18 Aliphatics	ND	100	17	ug/l	
	C19-C36 Aliphatics	ND	100	28	ug/l	
	C11-C22 Aromatics	35.6	100	29	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	88%	69%	40-140%
321-60-8	2-Fluorobiphenyl	100%	80%	40-140%
3386-33-2	1-Chlorooctadecane	32% [b]	36% [b]	40-140%
580-13-2	2-Bromonaphthalene	102%	81%	40-140%

(a) Confirmation run.
(b) Outside control limits due to possible matrix interference. Confirmed by refractionation/reanalysis.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: WX78383.D

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Report of Analysis

Client Sample ID:	D-1R DUP		
Lab Sample ID:	MC49177-9	**Date Sampled:**	12/13/16
Matrix:	AQ - Ground Water	**Date Received:**	12/16/16
Method:	MADEP VPH REV 1.1	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78383.D	1	12/20/16	AF	n/a	n/a	GWX3883
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	50.2	50	8.8	ug/l	
	C9- C12 Aliphatics (Unadj.)	13.8	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	15.2	50	9.7	ug/l	JB
	C5- C8 Aliphatics	45.5	50	8.8	ug/l	J
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	82%		70-130%
	2,3,4-Trifluorotoluene	94%		70-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	D-1R DUP		
Lab Sample ID:	MC49177-9	Date Sampled:	12/13/16
Matrix:	AQ - Ground Water	Date Received:	12/16/16
Method:	MADEP EPH REV 1.1 SW846 3510C	Percent Solids:	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16559.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2 [a]	DE16591.D	1	01/03/17	TA	12/27/16	OP49325	GDE925

	Initial Volume	Final Volume
Run #1	980 ml	2.0 ml
Run #2	980 ml	2.0 ml

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	38.7	100	29	ug/l	J
	C9-C18 Aliphatics	ND	100	17	ug/l	
	C19-C36 Aliphatics	ND	100	28	ug/l	
	C11-C22 Aromatics	37.7	100	29	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	80%	68%	40-140%
321-60-8	2-Fluorobiphenyl	97%	85%	40-140%
3386-33-2	1-Chlorooctadecane	34% [b]	27% [b]	40-140%
580-13-2	2-Bromonaphthalene	98%	86%	40-140%

(a) Confirmation run.
(b) Outside control limits due to possible matrix interference. Confirmed by refractionation/reanalysis.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	MW-13		
Lab Sample ID:	MC49177-10	Date Sampled:	12/14/16
Matrix:	AQ - Ground Water	Date Received:	12/16/16
Method:	MADEP VPH REV 1.1	Percent Solids:	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78384.D	1	12/20/16	AF	n/a	n/a	GWX3883
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	ND	50	8.8	ug/l	
	C9- C12 Aliphatics (Unadj.)	10.4	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	13.4	50	9.7	ug/l	JB
	C5- C8 Aliphatics	ND	50	8.8	ug/l	
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	80%		70-130%
	2,3,4-Trifluorotoluene	91%		70-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: DE16560.D

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Report of Analysis

Client Sample ID:	MW-13		
Lab Sample ID:	MC49177-10	Date Sampled:	12/14/16
Matrix:	AQ - Ground Water	Date Received:	12/16/16
Method:	MADEP EPH REV 1.1 SW846 3510C	Percent Solids:	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16560.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2							

	Initial Volume	Final Volume
Run #1	980 ml	2.0 ml
Run #2		

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	39.3	100	29	ug/l	J
	C9-C18 Aliphatics	ND	100	17	ug/l	
	C19-C36 Aliphatics	ND	100	28	ug/l	
	C11-C22 Aromatics	38.9	100	29	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	93%		40-140%
321-60-8	2-Fluorobiphenyl	95%		40-140%
3386-33-2	1-Chlorooctadecane	41%		40-140%
580-13-2	2-Bromonaphthalene	97%		40-140%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	MW-7		
Lab Sample ID:	MC49177-11	Date Sampled:	12/14/16
Matrix:	AQ - Ground Water	Date Received:	12/16/16
Method:	MADEP VPH REV 1.1	Percent Solids:	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78385.D	1	12/20/16	AF	n/a	n/a	GWX3883
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	12.1	50	8.8	ug/l	J
	C9- C12 Aliphatics (Unadj.)	18.4	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	18.5	50	9.7	ug/l	JB
	C5- C8 Aliphatics	11.8	50	8.8	ug/l	J
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	80%		70-130%
	2,3,4-Trifluorotoluene	93%		70-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: DE16562.D

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Report of Analysis

Client Sample ID:	MW-7		
Lab Sample ID:	MC49177-11	**Date Sampled:**	12/14/16
Matrix:	AQ - Ground Water	**Date Received:**	12/16/16
Method:	MADEP EPH REV 1.1 SW846 3510C	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16562.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2							

	Initial Volume	Final Volume
Run #1	980 ml	2.0 ml
Run #2		

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	72.5	100	29	ug/l	J
	C9-C18 Aliphatics	ND	100	17	ug/l	
	C19-C36 Aliphatics	ND	100	28	ug/l	
	C11-C22 Aromatics	71.1	100	29	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	88%		40-140%
321-60-8	2-Fluorobiphenyl	84%		40-140%
3386-33-2	1-Chlorooctadecane	44%		40-140%
580-13-2	2-Bromonaphthalene	86%		40-140%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	FB121416		
Lab Sample ID:	MC49177-12	Date Sampled:	12/14/16
Matrix:	AQ - Field Blank Water	Date Received:	12/16/16
Method:	MADEP VPH REV 1.1	Percent Solids:	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78409.D	1	12/21/16	AF	n/a	n/a	GWX3884
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	ND	50	8.8	ug/l	
	C9- C12 Aliphatics (Unadj.)	9.7	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	11.6	50	9.7	ug/l	JB
	C5- C8 Aliphatics	ND	50	8.8	ug/l	
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	84%		70-130%
	2,3,4-Trifluorotoluene	91%		70-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: DE16563.D DE16592.D

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Report of Analysis

Client Sample ID:	FB121416		
Lab Sample ID:	MC49177-12	Date Sampled:	12/14/16
Matrix:	AQ - Field Blank Water	Date Received:	12/16/16
Method:	MADEP EPH REV 1.1 SW846 3510C	Percent Solids:	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16563.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2 [a]	DE16592.D	1	01/03/17	TA	12/27/16	OP49325	GDE925

	Initial Volume	Final Volume
Run #1	920 ml	2.0 ml
Run #2	920 ml	2.0 ml

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	ND	110	31	ug/l	
	C9-C18 Aliphatics	ND	110	18	ug/l	
	C19-C36 Aliphatics	ND	110	29	ug/l	
	C11-C22 Aromatics	ND	110	31	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	91%	65%	40-140%
321-60-8	2-Fluorobiphenyl	102%	80%	40-140%
3386-33-2	1-Chlorooctadecane	31% [b]	37% [b]	40-140%
580-13-2	2-Bromonaphthalene	104%	81%	40-140%

(a) Confirmation run.
(b) Outside control limits .Sample results confirmed by re-fractionation/reanalysis.

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	MW-22S		
Lab Sample ID:	MC49177-13	Date Sampled:	12/14/16
Matrix:	AQ - Ground Water	Date Received:	12/16/16
Method:	MADEP VPH REV 1.1	Percent Solids:	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78386.D	1	12/20/16	AF	n/a	n/a	GWX3883
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	ND	50	8.8	ug/l	
	C9- C12 Aliphatics (Unadj.)	10	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	14.2	50	9.7	ug/l	JB
	C5- C8 Aliphatics	ND	50	8.8	ug/l	
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	81%		70-130%
	2,3,4-Trifluorotoluene	93%		70-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	MW-22S		
Lab Sample ID:	MC49177-13	Date Sampled:	12/14/16
Matrix:	AQ - Ground Water	Date Received:	12/16/16
Method:	MADEP EPH REV 1.1 SW846 3510C	Percent Solids:	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16564.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2							

	Initial Volume	Final Volume
Run #1	920 ml	2.0 ml
Run #2		

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	48.7	110	31	ug/l	J
	C9-C18 Aliphatics	ND	110	18	ug/l	
	C19-C36 Aliphatics	ND	110	29	ug/l	
	C11-C22 Aromatics	48.0	110	31	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	94%		40-140%
321-60-8	2-Fluorobiphenyl	93%		40-140%
3386-33-2	1-Chlorooctadecane	42%		40-140%
580-13-2	2-Bromonaphthalene	94%		40-140%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	EB121516		
Lab Sample ID:	MC49177-14	Date Sampled:	12/15/16
Matrix:	AQ - Equipment Blank	Date Received:	12/16/16
Method:	MADEP VPH REV 1.1	Percent Solids:	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78410.D	1	12/21/16	AF	n/a	n/a	GWX3884
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	ND	50	8.8	ug/l	
	C9- C12 Aliphatics (Unadj.)	10.4	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	11.2	50	9.7	ug/l	JB
	C5- C8 Aliphatics	ND	50	8.8	ug/l	
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	82%		70-130%
	2,3,4-Trifluorotoluene	93%		70-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	EB121516		
Lab Sample ID:	MC49177-14	**Date Sampled:**	12/15/16
Matrix:	AQ - Equipment Blank	**Date Received:**	12/16/16
Method:	MADEP EPH REV 1.1 SW846 3510C	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, Puerto Rico		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16593.D	1	01/03/17	TA	12/27/16	OP49325	GDE925
Run #2							

	Initial Volume	Final Volume
Run #1	960 ml	2.0 ml
Run #2		

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	ND	100	30	ug/l	
	C9-C18 Aliphatics	ND	100	17	ug/l	
	C19-C36 Aliphatics	ND	100	28	ug/l	
	C11-C22 Aromatics	ND	100	30	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	83%		40-140%
321-60-8	2-Fluorobiphenyl	82%		40-140%
3386-33-2	1-Chlorooctadecane	56%		40-140%
580-13-2	2-Bromonaphthalene	84%		40-140%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Raw Data: WX78370.D WX78371.D

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: MC49177
Account: AMANYWP Anderson Mulholland and Assoc.
Project: BMSMC, Building 5 Area, Puerto Rico

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
MC49177-3MS	WX78370.D	1	12/20/16	AF	n/a	n/a	GWX3883
MC49177-3MSD	WX78371.D	1	12/20/16	AF	n/a	n/a	GWX3883
MC49177-3	WX78369.D	1	12/20/16	AF	n/a	n/a	GWX3883

The QC reported here applies to the following samples: Method: MADEP VPH REV 1.1

MC49177-1, MC49177-2, MC49177-3, MC49177-4, MC49177-5, MC49177-6, MC49177-7, MC49177-8, MC49177-9, MC49177-10, MC49177-11, MC49177-13

CAS No.	Compound	MC49177-3 ug/l	Q	Spike ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
	C5- C8 Aliphatics (Unadj.)	ND		300	355	119	300	350	117	1	70-130/25
	C9- C12 Aliphatics (Unadj.)	12.8	JB	450	457	111	450	445	108	3	70-130/25
	C9- C10 Aromatics (Unadj.)	14.8	JB	150	137	81	150	133	79	3	70-130/25

CAS No.	Surrogate Recoveries	MS	MSD	MC49177-3	Limits
	2,3,4-Trifluorotoluene	80%	80%	85%	70-130%
	2,3,4-Trifluorotoluene	88%	87%	91%	70-130%

* = Outside of Control Limits.

Raw Data: DE16544.D DE16545.D

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: MC49177
Account: AMANYWP Anderson Mulholland and Assoc.
Project: BMSMC, Building 5 Area, Puerto Rico

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP49325-MS	DE16544.D	1	12/28/16	TA	12/27/16	OP49325	GDE923
OP49325-MSD	DE16545.D	1	12/28/16	TA	12/27/16	OP49325	GDE923
MC49177-3	DE16553.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
MC49177-3 [a]	DE16581.D	1	01/03/17	TA	12/27/16	OP49325	GDE925

The QC reported here applies to the following samples: Method: MADEP EPH REV 1.1

MC49177-1, MC49177-2, MC49177-3, MC49177-4, MC49177-5, MC49177-6, MC49177-7, MC49177-8, MC49177-9, MC49177-10, MC49177-11, MC49177-12, MC49177-13, MC49177-14

CAS No.	Compound	MC49177-3 ug/l	Q	Spike ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
	C11-C22 Aromatics (Unadj.)	41.1	J	870	807	88	851	726	80	11	40-140/25
	C9-C18 Aliphatics	ND		326	206	63	319	188	59	9	40-140/25
	C19-C36 Aliphatics	ND		435	402	92	426	375	88	7	40-140/25

CAS No.	Surrogate Recoveries	MS	MSD	MC49177-3	MC49177-3	Limits
84-15-1	o-Terphenyl	94%	88%	77%	64%	40-140%
321-60-8	2-Fluorobiphenyl	95%	99%	97%	84%	40-140%
3386-33-2	1-Chlorooctadecane	49%	46%	26%* [b]	29%* [b]	40-140%
580-13-2	2-Bromonaphthalene	97%	99%	97%	85%	40-140%

(a) Confirmation run.
(b) Outside control limits due to possible matrix interference. Confirmed by refractionation/reanalysis.

* = Outside of Control Limits.

8.3.1

8

ACCUTEST LABORATORIES

CHAIN OF CUSTODY

PAGE 1 OF 2

MA

30 D'Angelo Dr., Building One, Marlborough, MA 01752
TEL. 508-481-6200 FAX 508-481-7753
www.accutest.com

FED-EX Tracking # 777961610842

Bottle Order Control #

Accutest Quote #

Accutest Job # MC49177

Client / Reporting Information

Company Name: Anderson Mulholland & Associates

Street Address: 2700 Westchester Avenue, Suite 417

City: Purchase State: NY Zip: 10577

Project Contact: Terry Taylor E-mail:

Phone #: 914-251-0400 Fax #:

Sampler(s) Name(s): Phone #:

Project Information

Project Name: 4th Q 2016 Groundwater Sampling - Onsite Wells

Street:

City: Humacao State: PR

Project #:

Client Purchase Order #:

Project Manager: Terry Taylor

Billing Information (if different from Report to)

Company Name:

Street Address:

City: State: Zip:

Attention:

Requested Analysis (see TEST CODE sheet)

Matrix Codes: DW - Drinking Water; GW - Ground Water; WW - Water; SW - Surface Water; SO - Soil; SL - Sludge; SED-Sediment; OI - Oil; LIQ - Other Liquid; AIR - Air; SOL - Other Solid; WP - Wipe; FB-Field Blank; EB-Equipment Blank; RB- Rinse Blank; TB-Trip Blank

Accutest Sample #	Field ID / Point of Collection	MEOH/DI Vol #	Collection Date	Collection Time	Sampled by	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	NONE	DI Water	MEOH	ENCORE	VMAVPHR	SMAEPHR	LAB USE ONLY
-1	G-1R3		12/13/16	12:50	NR	GW	5	5								X	X	
-2	EB 121416		12-14-16	1008	NR	EB	5	5								X	X	
-3	MW-21S		12-14-16	1130	NR	GW	5	5								X	X	
	MW-21S MS		12-14-16	1203	NR	GW	5	5								X	X	
↓	MW-21S MSD		12-14-16	1240	NR	GW	5	5								X	X	
-4	FB 121316		12-13-16	1550	NR	FB	5	5								X	X	
-5	S-43S		12-15-16	1225	RS	GW	5	5								X	X	
-6	S-42S		12-15-16	1257	NR	GW	5	5								X	X	

Turnaround Time (Business days)

- [X] Std. 15 Business Days
- [ ] Std. 10 Business Days (by Contract only)
- [ ] 10 Day RUSH
- [ ] 5 Day RUSH
- [ ] 3 Day EMERGENCY
- [ ] 2 Day EMERGENCY
- [ ] 1 Day EMERGENCY

Emergency & Rush T/A data available VIA Lablink

Approved By (Accutest PM): / Date:

Data Deliverable Information

- [ ] Commercial "A" (Level 1)
- [ ] Commercial "B" (Level 2)
- [X] FULL T1 (Level 3+4)
- [ ] NJ Reduced
- [ ] Commercial "C"
- [ ] NYASP Category A
- [ ] NYASP Category B
- [ ] State Forms
- [ ] EDD Format
- [ ] Other

Commercial "A" = Results Only

Commercial "B" = Results + QC Summary

NJ Reduced = Results + QC Summary + Partial Raw data

Comments / Special Instructions

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1	12-15-16 1700	2 Fed EX	2	12/16/16 0950	2
3		3	4		4
5		6	Custody Seal #	Intact	Preserved where applicable	On Ice: 4	Cooler Temp.: 1.9, 1.7, 1.4, 3.5

n.5

MC49177: Chain of Custody
Page 1 of 4

ACCUTEST LABORATORIES

CHAIN OF CUSTODY

PAGE 2 OF 2

MA

30 D'Angelo Drive, Building One, Marlborough, MA 01752
TEL 508-481-6200 FAX 508-481-7753
www.accutest.com

FED-EX Tracking # 777961644842 | Bottle Order Control #

Accutest Quote # | Accutest Job # MC49177

Client / Reporting Information	Project Information	Requested Analysis (see TEST CODE sheet)	Matrix Codes
Company Name: Anderson Mulholland & Associates	Project Name: 4th Q 2016 Groundwater Sampling - Onsite Wells		DW - Drinking Water; GW - Ground Water; WW - Water; SW - Surface Water; SO - Soil; SL - Sludge; SED-Sediment; OI - Oil; LIQ - Other Liquid; AIR - Air; SOL - Other Solid; WP - Wipe; FB-Field Blank; EB-Equipment Blank; RB- Rinse Blank; TB-Trip Blank
Street Address: 2700 Westchester Avenue, Suite 417	Street	Billing Information (if different from Report to)	
City: Purchase State: NY Zip: 10577	City: Humacao State: PR	Company Name	
Project Contact: Terry Taylor E-mail	Project #	Street Address	
Phone #: 914-261-0400 Fax #	Client Purchase Order #	City State Zip	
Sampler(s) Name(s) Phone #	Project Manager: Terry Taylor	Attention:	

Accutest Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Collection Date	Collection Time	Sampled by	Matrix	# of bottles	Number of preserved Bottles: HCl	NaOH	HNO3	H2SO4	NONE	DI Water	MEOH	ENCORE	VMAVPHR	BMAEPHR	LAB USE ONLY
-7	E-1R		12/13/16	1207	JD	GW	35	5				4				V	V	
-8	D-1R		12/13/16	1424	JD	GW	35	5				4				V	V	
-9	D-1R DUP		12/13/16	1436	JD	GW	35	5				4				V	V	
-10	MW-13		12-14-16	1154	JD	GW	5	5								X	X	
-11	MW-7		12-14-16	1341	JD	GW	5	5								X	X	
-12	FB121416		12-14-16	1514	NR	EB	5	5								X	X	
-13	MW-22S		12-14-16	1705	NR	GW	5	5								X	X	
-14	EB121516		12-15-16	1007	NR	EB	5	5								X	X	

Turnaround Time (Business days)

- [X] Std. 15 Business Days
- [ ] Std. 10 Business Days (by Contract only)
- [ ] 10 Day *RUSH*
- [ ] 8 Day *RUSH*
- [ ] 3 Day *EMERGENCY*
- [ ] 2 Day *EMERGENCY*
- [ ] 1 Day *EMERGENCY*

Emergency & Rush T/A data available VIA Labnet

Approved By (Accutest PM): / Date:

Data Deliverable Information

- [ ] Commercial "A" (Level 1)
- [ ] Commercial "B" (Level 2)
- [X] FULLT1 (Level 3+4)
- [ ] NJ Reduced
- [ ] Commercial "C"
- [ ] NYASP Category A
- [ ] NYASP Category B
- [ ] State Forms
- [ ] EDD Format
- [ ] Other

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary
NJ Reduced = Results + QC Summary + Partial Raw data

Comments / Special Instructions

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1	12-15-16 1700	1 FedEx	2		2
Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
3		3	4		4
Relinquished by:	Date Time:	Received By:	Custody Seal #	Intact / Not Intact	Preserved where applicable	On Ice	Cooler Temp.
5		5	286,287,288,289,290				

5.1.5

EXECUTIVE NARRATIVE

SDG No:	**MC49177**	Laboratory:	**Accutest, Massachusetts**
Analysis:	**MADEP VPH**	Number of Samples:	**16**
Location:	BMSMC, Building 5 Area Humacao, PR		

SUMMARY: Sixteen (16) samples were analyzed for Volatiles TPHC Ranges by method MADEP VPH. Samples were validated following the METHOD FOR THE DETERMINATION OF VOLATILE PETROLEUM HYDROCARBONS (VPH) quality control criteria, Massachusetts Department of Environmental Protection, Revision 1.1 (2004). Also the general validation guidelines promulgated by the USEPA Hazardous Wastes Support Section. The QC criteria and data validation actions listed on the data review worksheets are from the primary guidance document, unless otherwise noted.

Results are valid and can be used for decision making purposes.

Critical issues: **None**
Major: **None**
Minor: **None**

Critical findings: **None**
Major findings: **None**
Minor findings:

1. Continuing and final calibration verification meets method specific requirements except in the cases described in this document. The % difference for VPH in the rt5.5/7 retention time window in the continuing and ending calibration verification was outside the method performance criteria. Results are qualified as estimated in affected samples.

2. Target analytes detected in the method and field/equipment blanks. Laboratory qualified positive results below the reporting limit with a B qualifier. Target analytes detected below the reporting limits are qualified as non-detects (U). Results above the reporting limits are retained.

3. MS/MSD % recovery within the laboratory control limits except for the cases described in the Data Review Worksheet. No action taken, recovery criteria apply to the unspiked sample. Unspiked sample from another job.

COMMENTS: Results are valid and can be used for decision making purposes.

Reviewers Name: Rafael Infante
Chemist License 1888

Signature: Rafael Infante

Date: January 21, 2017

SAMPLE ORGANIC DATA SAMPLE SUMMARY

Sample ID: MC49177-1
Sample location: BMSMC Building 5 Area
Sampling date: 12/13/2016
Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	161	ug/L	1	-	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	85000	ug/L	100	-	-	Yes
Ç9 - C10 Aromatics (Unadj.)	151	ug/L	1	-	-	Yes
Ç5 - C8 Aliphatics	85.5	ug/L	1	-	J	Yes
Ç9 - C12 Aliphatics	17800	ug/L	1	-	-	Yes

Sample ID: MC49177-2
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: AQ - Equipment Blank

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics (Unadj.)	10.1	ug/L	1	JB	U	Yes
Ç9 - C10 Aromatics (Unadj.)	14.5	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49177-3
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics (Unadj.)	12.8	ug/L	1	JB	U	Yes
Ç9 - C10 Aromatics (Unadj.)	14.8	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49177-4
Sample location: BMSMC Building 5 Area
Sampling date: 12/13/2016
Matrix: AQ -Field Blank Water

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics (Unadj.)	9.2	ug/L	1	JB	U	Yes
Ç9 - C10 Aromatics (Unadj.)	12.8	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49177-5
Sample location: BMSMC Building 5 Area
Sampling date: 12/15/2016
Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	42.9	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	59.5	ug/L	1	B	-	Yes
Ç9 - C10 Aromatics (Unadj.)	29.7	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	31.4	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics	27.3	ug/L	1	J	J	Yes

Sample ID: MC49177-6
Sample location: BMSMC Building 5 Area
Sampling date: 12/15/2016
Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	15.8	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	14.4	ug/L	1	JB	U	Yes
Ç9 - C10 Aromatics (Unadj.)	13.9	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	15.3	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49177-7
Sample location: BMSMC Building 5 Area
Sampling date: 12/13/2016
Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	23.6	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	17.9	ug/L	1	JB	U	Yes
Ç9 - C10 Aromatics (Unadj.)	13.1	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	14.5	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49177-8
Sample location: BMSMC Building 5 Area
Sampling date: 12/13/2016
Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	11.1	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	16.2	ug/L	1	JB	U	Yes
Ç9 - C10 Aromatics (Unadj.)	16.0	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49177-9
Sample location: BMSMC Building 5 Area
Sampling date: 12/13/2016
Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50.2	ug/L	1	-	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	13.8	ug/L	1	JB	U	Yes
Ç9 - C10 Aromatics (Unadj.)	15.2	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	45.5	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49177-10
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics (Unadj.)	10.4	ug/L	1	JB	U	Yes
Ç9 - C10 Aromatics (Unadj.)	13.4	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49177-11
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	12.1	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	18.4	ug/L	1	JB	U	Yes
Ç9 - C10 Aromatics (Unadj.)	18.5	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	11.5	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49177-12
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: AQ - Field Blank Water

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics (Unadj.)	9.7	ug/L	1	JB	U	Yes
Ç9 - C10 Aromatics (Unadj.)	11.6	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49177-13
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics (Unadj.)	10	ug/L	1	JB	U	Yes
Ç9 - C10 Aromatics (Unadj.)	14.2	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49177-14
Sample location: BMSMC Building 5 Area
Sampling date: 12/15/2016
Matrix: AQ - Equipment Blank

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics (Unadj.)	10.4	ug/L	1	JB	U	Yes
Ç9 - C10 Aromatics (Unadj.)	11.2	ug/L	1	JB	U	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	UJ	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49177-3MS
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	355	ug/L	1	-	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	457	ug/L	1	-	-	Yes
Ç9 - C10 Aromatics (Unadj.)	137	ug/L	1	-	-	Yes

Sample ID: MC49177-3MSD
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	350	ug/L	1	-	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	455	ug/L	1	-	-	Yes
Ç9 - C10 Aromatics (Unadj.)	133	ug/L	1	-	-	Yes

DATA REVIEW WORKSHEETS

Type of validation Full:__X____ Project Number:_MC49177_____
Limited:_____ Date:_____12/13-15/2016_____
Shipping date:_____12/15/2016_____
EPA Region:_____2_____

REVIEW OF VOLATILE PETROLEUM HYDROCARBON (VPHs) PACKAGE

The following guidelines for evaluating volatile organics were created to delineate required validation actions. This document will assist the reviewer in using professional judgment to make more informed decision and in better serving the needs of the data users. The sample results were assessed according to the data validation guidance documents in the following order of precedence METHOD FOR THE DETERMINATION OF VOLATILE PETROLEUM HYDROCARBONS (VPH), Massachusetts Department of Environmental Protection, Revision 1.1 (2004). Also the general validation guidelines promulgated by the USEPA Hazardous Wastes Support Section. The QC criteria and data validation actions listed on the data review worksheets are from the primary guidance document, unless otherwise noted.

The hardcopied (laboratory name) _Accutest_Laboratories_____ data package received has been reviewed and the quality control and performance data summarized. The data review for SVOCs included:

Lab. Project/SDG No.: __MC49177_____ Sample matrix: __Groundwater_____
No. of Samples: _____16_____
Field blank No.: _____MC49177-4;_MC49177-12_____
Equipment blank No.: ___MC49177-2;_MC49177-14_____
Trip blank No.: _____-_____
Field duplicate No.: _____ MC49177-8/MC49177-9_____

__X____ Data Completeness
__X____ Holding Times
__N/A__ GC/MS Tuning
__N/A__ Internal Standard Performance
__X____ Blanks
__X____ Surrogate Recoveries
__X____ Matrix Spike/Matrix Spike Duplicate
___X__ Laboratory Control Spikes
___X__ Field Duplicates
___X__ Calibrations
___X__ Compound Identifications
___X__ Compound Quantitation
___X__ Quantitation Limits

Overall Comments:
_Volatiles_by_GC_by_Method_MADEP_VPH,_REV_1.1._____

Definition of Qualifiers:

J- Estimated results
U- Compound not detected
R- Rejected data
UJ- Estimated nondetect

Reviewer:_____
Date:_____January_20,_2017_____

All criteria were met __x___
Criteria were not met and/or see below _____

I. DATA COMPLETNESS
A. Data Package:

MISSING INFORMATION	DATE LAB. CONTACTED	DATE RECEIVED

B. Other Discrepancies:

All criteria were met ___X___
Criteria were not met and/or see below _____

HOLDING TIMES
The objective of this parameter is to ascertain the validity of the results based on the holding time of the sample from time of collection to the time of extraction, and subsequently from the time of extraction to the time of analysis.

Complete table for all samples and note the analysis and/or preservation not within criteria

SAMPLE ID	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	ACTION
Samples analyzed within method recommended holding time. Sample preservation within the required criteria.				

Criteria

Preservation:

Samples analyzed with ambient purge temperature: Samples must be acidified to a pH of 2.0 or less at the time of collection.
Samples analyzed with heated purge temperature: Samples must be treated to a pH of 11.0 or greater at the time of collection.
Methanol preservation of soil/sediment samples is mandatory. Methanol (purge-and-trap grade) must be added to the sample vial before or immediately after sample collection. In lieu of the in-field preservation of samples with methanol, soil samples may be obtained in specially-designed air tight sampling devices, provided that the samples are extruded and preserved in methanol within 48 hours of collection.

Holding times:

Aqueous samples using ambient or heated purge - analyze within 14 days.
Soil/sediment samples - analysis within 28 days.

Cooler temperature (Criteria: 4 ± 2 °C):_____3.8°C_____

Actions: Qualify positive results/non-detects as follows:

If holding times are exceeded, estimate positive results (J) and nondetects (UJ).
If holding times are grossly exceeded, use professional judgment to qualify data. The data reviewer may choose to estimate positive results (J) and rejects nondetects (R).
If samples were not at the proper temperature (> 10°C) or improperly preserved, use professional judgment to qualify the results.

All criteria were met ___X___
Criteria were not met and/or see below _____

CALIBRATIONS VERIFICATION

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data.

Date of initial calibration:___10/31/16_____

Dates of initial calibration verification:__10/31/16_

Instrument ID numbers:_____GCWX_____

Matrix/Level:_____AQUEOUS/MEDIUM_____

DATE	LAB FILE ID#	ANALYTE	CRITERIA OUT RFs, %RSD, %D, r	SAMPLES AFFECTED
Initial and initial calibration verification meet method specific requirements				

Criteria- ICAL

- Five point calibration curve.
- The percent relative standard deviation (%RSD) of the calibration factor must be equal to or less than 25% over the working range for the analyte of interest. When this condition is met, linearity through the origin may be assumed, and the average calibration factor is used in lieu of a calibration curve.
- A collective calibration factor must also be established for each hydrocarbon range of interest. Calculate the collective CFs for C5-C8 Aliphatic Hydrocarbons and C9-C12 Aliphatic Hydrocarbons using the FID chromatogram. Calculate the collective CF for the C9-C10 Aromatic Hydrocarbons using the PID chromatogram. Tabulate the summation of the peak areas of all components in that fraction against the total concentration injected. The %RSD of the calibration factor must be equal to or less than 25% over the working range for the hydrocarbon range of interest.

Criteria- CCAL

- At a minimum, the working calibration factor must be verified on each working day, after every 20 samples, and at the end of the analytical sequence by the injection of a mid-level continuing calibration standard to verify instrument performance and linearity.
- If the percent difference (%D) for any analyte varies from the predicted response by more than ±25%, a new five-point calibration must be performed for that analyte. Greater percent differences are permissible for n-nonane. If the %D for n-nonane is greater than 30, note the nonconformance in the case narrative. It should be noted that the %Ds are calculated when CFs are used for the initial calibration and

- percent drifts are calculated when calibration curves using linear regression are used for the initial calibration.

Actions:

If %RSD > 25% for target compounds or a correlation coefficient < 0.99, estimate positive results (J) and use professional judgment to qualify nondetects.
If % D > 25% (> 30 for nonane), estimate positive results (J) and nondetects (UJ).

CALIBRATIONS VERIFICATION

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data.

Date of initial calibration:_____10/31/16_____

Dates of continuing calibration verification:__12/20/16;_12/21/16___

Dates of final calibration verification:_10/31/16;_12/20/16;_12/21/16_

Instrument ID numbers:_____GCWX_____

Matrix/Level:_____AQUEOUS/MEDIUM_____

DATE	LAB FILE ID#	ANALYTE	CRITERIA OUT RFs, %RSD, **%D**, r	SAMPLES AFFECTED
12/20/16	cc3857-50	rt5.5/7	27.4 %	MC49177-1; -3; -3MS/-3MSD; -5 to -11; -13; -2; -4
			26.5 %	
12/21/16	cc3857-50	rt5.5/7	31.2 %	MC49177-12; -14;
			28.3 %	

Note: Continuing and final calibration verification meets method specific requirements except in the cases described in this document. The % difference for VPH in the rt5.5/7 retention time window in the continuing and ending calibration verification outside the method performance criteria. Results are qualified as estimated in affected samples.

A separate worksheet should be filled for each initial curve

All criteria were met _____
Criteria were not met and/or see below ___X___

V A. BLANK ANALYSIS RESULTS (Sections 1 & 2)

The assessment of the blank analysis results is to determine the existence and magnitude of contamination problems. The criteria for evaluation of blanks apply only to blanks associated with the samples, including trip, equipment, and laboratory blanks. If problems with any blanks exist, all data associated with the case must be carefully evaluated to determine whether or not there is an inherent variability in the data for the case, or if the problem is an isolated occurrence not affecting other data. A Laboratory Method Blank must be run after samples suspected of being highly contaminated to determine if sample carryover has occurred.

List the contamination in the blanks below. High and low levels blanks must be treated separately.

Laboratory blanks

DATE ANALYZED	**LAB ID**	**LEVEL/ MATRIX**	**COMPOUND**	**CONCENTRATION UNITS**
_METHOD_BLANKS_MEET_THE_METHOD_SPECIFIC_CRITERIA_EXCEPT_IN_THE_____ _CASES_DESCRIBED_IN_THIS_DOCUMENT._____				
_12/20/16___	GWX3883-MB__	Aqueous/low__	C9-C12_Aliphatics_(Unadj.)___	10.5_ug/L_____
_____			C9-C10_Aromatics_(Unadj.)___	14.4_ug/L____
_12/21/16___	GWX3884-MB__	Aqueous/low___	C9-C12_Aliphatics_(Unadj.)___	11.4_ug/L____
_____			C9-C10_Aromatics_(Unadj.)___	12.2_ug/L____

Note: Laboratory qualified positive results below the reporting limit with a B qualifier. Target analytes detected below the reporting limits are qualified as non-detect (U); results detected above the reporting limits are retained.

Field/Trip/**Equipment**

A methanol trip blank or acidified reagent water trip blank **should** continually accompany each soil/sediment sample or water sample batch, respectively, during sampling, storage, and analysis.

DATE ANALYZED	**LAB ID**	**LEVEL/ MATRIX**	**COMPOUND**	**CONCENTRATION UNITS**
_NO_TRIP_BLANK_ASSOCIATED_WITH_THIS_DATA_PACKAGE._____ _ANALYTES_DETECTED_IN_FIELD/EQUIPMENT_BLANKS_ANALYZED_AT_A_____ _CONCENTRATION_BELOW_THE_REPORTING_LIMITS_EXCEPT_FOR_THE_CASES____ _DESCRIBED_IN_HIS_DOCUMENT._____				
_12/20/16____	MC49177-2__	Aqueous/low_	C5-C8_Aliphatics_(Unadj.)___	10.1_ug/L_____
_____			C9-C12_Aliphatics_(Unadj.)__	14.5__ug/L_____

DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS
12/20/16	MC49177-4	Aqueous/low	C9-C12_Aliphatics_(Unadj.)	9.2_ug/L
			C9-C10_Aromatics_(Unadj.)	12.8_ug/L
12/21/16	MC49177-12	Aqueous/low	C9-C12_Aliphatics_(Unadj.)	9.7_ug/L
			C9-C10_Aromatics_(Unadj.)	11.6_ug/L
12/21/16	MC49177-14	Aqueous/low	C9-C12_Aliphatics_(Unadj.)	10.4_ug/L
			C9-C10_Aromatics_(Unadj.)	12.8_ug/L

Note: Results below the reporting limits are qualified as non-detected (U).

V B. BLANK ANALYSIS RESULTS (Section 3)

Blank Actions

The ALs for samples which have been diluted should be corrected for the sample dilution factor and/or % moisture, where applicable. Peaks must not be detected above the Reporting Limit within the retention time window of any analyte of interest. The hydrocarbon ranges must not be detected at a concentration greater than 10% of the most stringent MCP cleanup standard. Specific actions area as follows:

If the concentration is < sample quantitation limit (SQL) and < AL, report the compound as not detected (U) at the SQL.
If the concentration is $\geq$ SQL but < AL, report the compound as not detected (U) at the reported concentration.
If the concentration is > AL, report the concentration unqualified.

All criteria were met __X___
Criteria were not met and/or see below _____

SURROGATE SPIKE RECOVERIES

Laboratory performance of individual samples is established by evaluation of surrogate spike recoveries. All samples are spiked with surrogate compounds prior to sample analysis. The accuracy of the analysis is measured by the surrogate percent recovery. Since the effects of the sample matrix are frequently outside the control of the laboratory and may present relatively unique problems, the validation of data is frequently subjective and demands analytical experience and professional judgment.
List the percent recoveries (%Rs) which do not meet the criteria for surrogate recovery.
Matrix: solid/aqueous

SAMPLE ID	SURROGATE COMPOUND	ACTION
	2,3,4-Trifluorotoluene	

_SURROGATE_STANDARD_RECOVERIES_WITHIN_LABORATORY_CONTROL_____
_LIMITS_____

QC Limits* (Aqueous)
_____LL_to_UL___ _70_to_130_ ___to_____ ___to_____
QC Limits* (Solid)
_____LL_to_UL___ ____to_____ ___to_____ ___to_____

It is recommended that surrogate standard recoveries be monitored and documented on a continuing basis. At a minimum, when surrogate recovery from a sample, blank, or QC sample is less than 70% or more than 130%, check calculations to locate possible errors, check the fortifying standard solution for degradation, and check changes in instrument performance.

If the cause cannot be determined, reanalyze the sample unless one of the following exceptions applies:

(1) Obvious interference is present on the chromatogram (e.g., unresolved complex mixture);
(2) Percent moisture of associated soil/sediment sample is >25% and surrogate recovery is >10%; or
(3) The surrogate exhibits high recovery and associated target analytes or hydrocarbon ranges are not detected in sample.

If a sample with a surrogate recovery outside of the acceptable range is not reanalyzed based on any of these aforementioned exceptions, this information must be noted on the data report form and discussed in the Executive Report. Analysis of the sample on dilution may diminish matrix-related surrogate recovery problems. This approach can be used as long as the reporting limits to evaluate applicable MCP standards can still be achieved with the dilution. If not, reanalysis without dilution must be performed.

All criteria were met __X___
Criteria were not met and/or see below _____

VII. A MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD)

This data is generated to determine long term precision and accuracy in the analytical method for various matrices. This data alone cannot be used to evaluate the precision and accuracy of individual samples.

At the request of the data user, and in consideration of sample matrices and data quality objectives, matrix spikes and matrix duplicates may be analyzed with every batch of 20 samples or less per matrix.

- **Matrix duplicate** - Matrix duplicates are prepared by analyzing one sample in duplicate. The purpose of the matrix duplicates is to determine the homogeneity of the sample matrix as well as analytical precision. The RPD of detected results in the matrix duplicate samples must not exceed 50 when the results are greater than 5x the reporting limit.
- The desired spiking level is 50% of the highest calibration standard. However, the total concentration in the MS (including the MS and native concentration in the unspiked sample) should not exceed 75% of the highest calibration standard in order for a proper evaluation to be performed. The purpose of the matrix spike is to determine whether the sample matrix contributes bias to the analytical results. The corrected concentrations of each analyte within the matrix spiking solution must be within 70 - 130% of the true value. Lower recoveries of n-nonane are permissible (if included in the calibration of the C9-C12 aliphatic range), but must be noted in the narrative if <30%.

MS/MSD Recoveries and Precision Criteria

Sample ID:_MC49177-3_MS/MSD_____ Matrix/Level:_Groundwater_____

List the %Rs, RPD of the compounds which do not meet the QC criteria.

Note: MS/MSD % recovery and RPD within laboratory control limits.

Sample ID:_MC49195-2_MS/MSD_____ Matrix/Level:_Groundwater_____

The QC reported here applies to the following samples: Method: **MADEP VPH REV 1.1**
MC49177-12, MC49177-14

Compound	MC49195-2 ug/l	Q	Spike ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
C9-C10 Aromatics (Unadj.)	15.4		150	116	67* a	150	117	68* a	1	70-130/25

(a) Outside control limits due to possible matrix interference.
* = Outside of Control Limits.

Note: MS/MSD % recovery outside the laboratory control limits. No action taken, recovery criteria apply to the unspiked sample. Unspiked sample from another job.

No action is taken on MS/MSD results alone to qualify the entire case. However, used informed professional judgment, the data reviewer may use the MS/MSD results in conjunction with other QC criteria and determine the need for some qualification of the data. In those instances where it can be determined that the results of the MS/MSD affect only the sample spiked, the qualification should be limited to this sample alone. However, it may be determined through the MS/MSD results that the laboratory is having a systematic problem in the analysis of one or more analytes, which affects the associated samples.

2. MS/MSD – Unspiked Compounds

List the concentrations of the unspiked compounds and determine the % RSDs of these compounds in the unspiked sample, matrix spike, and matrix spike duplicate.

COMPOUND	CONCENTRATION SAMPLE	MS	MSD	%RPD	ACTION

Criteria: None specified, use %RSD $\leq$ 50 as professional judgment.

Actions:

If the % RSD > 50, qualify the results in the spiked sample as estimate (J).
If the % RSD is not calculable (NC) due to nondetect value in the sample, MS, and/or MSD, use professional judgment to qualify sample data.

A separate worksheet should be used for each MS/MSD pair.

All criteria were met __X___
Criteria were not met and/or see below _____

VIII. LABORATORY CONTROL SAMPLE (LCS/LCSD) ANALYSIS

This data is generated to determine accuracy of the analytical method for various matrices.

1. LCS Recoveries Criteria

List the %R of compounds which do not meet the criteria

LCS ID	COMPOUND	% R	QC LIMIT	ACTION
__LCS_RECOVERY_WITHIN_LABORATORY_CONTROL_LIMTS_____				

Criteria:
* Refer to QAPP for specific criteria.
* The spike recovery must be between 70% and 130%. Lower recoveries of n-nonane are permissible (if included in the calibration of the C9-C12 aliphatic range). If the recovery of n-nonane is <30%, note the nonconformance in the executive narrative.

Actions:
Actions on LCS recovery should be based on both the number of compounds that are outside the %R criteria and the magnitude of the excedance of the criteria.

If the %R of the analyte is > UL, qualify all positive results (j) for the affected analyte in the associated samples and accept nondetects.
If the %R of the analyte is < LL, qualify all positive results (j) and reject (R) nondetects for the affected analyte in the associated samples.
If more than half the compounds in the LCS are not within the required recovery criteria, qualify all positive results as (J) and reject nondetects (R) for all target analyte(s) in the associated samples.

2. Frequency Criteria:

Where LCS analyzed at the required frequency and for each matrix (1 per 20 samples per matrix)? **Yes** or No.
If no, the data may be affected. Use professional judgment to determine the severity of the effect and qualify data accordingly. Discuss any actions below and list the samples affected. Discuss the actions below:

All criteria were met __X___
Criteria were not met and/or see below _____

IX. FIELD/LABORATORY DUPLICATE PRECISION

Sample IDs:__MC49177-8/MC49177-9____ Matrix:__Groundwater__

Field/laboratory duplicates samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than laboratory duplicates which measures only laboratory performance. It is also expected that soil duplicate results will have a greater variance than water matrices due to difficulties associated with collecting identical field duplicate samples.

COMPOUND	SQL	SAMPLE CONC.	DUPLICATE CONC.	RPD	ACTION
Field duplicate analyzed with this data package. RPD within laboratory and validation guidance document criteria (± 50 %) for analytes detected above reporting limits.					

Criteria:

The project QAPP should be reviewed for project-specific information.
RPD ± 30% for aqueous samples, RPD ± 50 % for solid samples if results are ≥ SQL.
If both samples and duplicate are <5 SQL, the RPD criteria is doubled.

SQL = soil quantitation limit

Actions:

If both the sample and the duplicate results are nondetects (ND), the RPD is not calculable (NC). No action is needed.

Qualify as estimated positive results (J) and nondetects (UJ) for the compound that exceeded the above criteria.

If one sample result is not detected and the other is ≥ 5x the SQL qualify (J/UJ).

Note: If SQLs for the sample and duplicate are significantly different, use professional judgment to determine if qualification is appropriate.

If one sample value is not detected and the other is < 5x the SQL, use professional judgment to determine if qualification is appropriate.

All criteria were met __X___
Criteria were not met and/or see below _____

XI. COMPOUND IDENTIFICATION

The compound identification evaluation is to verify that the laboratory correctly identified target analytes as well as tentatively identified compounds (TICs).

1. Verify that the target analytes were within the retention time windows.

    - Retention time windows must be re-established for each Target VPH Analyte each time a new GC column is installed, and must be verified and/or adjusted on a daily basis.
    - Coelution of the m- and p- xylene isomers is permissible.
    - All surrogates must be adequately resolved from individual Target Analytes included in the VPH Component Standard.
    - For the purposes of this method, adequate resolution is assumed to be achieved if the height of the valley between two peaks is less than 25% of the average height of the two peaks.
    - The n-pentane (C5) and MtBE peaks must be adequately resolved from any solvent front that may be present on the FID and PID chromatograms, respectively.

    Note: Target analytes were within the retention time window.

2. If target analytes and/or TICs were not correctly identified, request that the laboratory resubmit the corrected data.

All criteria were met __X___
Criteria were not met and/or see below _____

XII. QUANTITATION LIMITS AND SAMPLE RESULTS

The sample quantitation evaluation is to verify laboratory quantitation results.

1. In the space below, please show a minimum of one sample calculation:

MC49177-1 VPH (C9 – C12 Aliphatics) RF = 2.125×10^4

FID

[ ] = $(3343631)/(2.125 \times 10^4)$

[ ] = 157.3 ppb Ok

MC49177-1 VPH (C9 – C10 Aromatics) RF = 7.865×10^3

PID

[ ] = $(1187738)/(7.865 \times 10^3)$

[ ] = 151.0 ppb Ok

2. If requested, verify that the results were above the laboratory method detection limit (MDLs).

3. If dilutions performed, were the SQLs elevated accordingly by the laboratory? List the affected samples and dilution factor in the table below.

SAMPLE ID	DILUTION FACTOR	REASON FOR DILUTION
MC49177-1	100 x	C9 – C12 aliphatics over the calibration range.

If dilution was not performed and the results were above the concentration range, estimate results (J) for the affected compounds. List the affected samples/compounds:

_____

_____

EXECUTIVE NARRATIVE

SDG No:	**MC49177**	Laboratory:	**Accutest, Massachusetts**
Analysis:	**MADEP EPH**	Number of Samples:	**16**
Location:	BMSMC, Building 5 Area Humacao, PR		

SUMMARY: Sixteen (16) samples were analyzed for Extractable TPHC Ranges by method MADEP EPH. Samples were validated following the METHOD FOR THE DETERMINATION OF EXTRACTABLE PETROLEUM HYDROCARBONS (EPH) quality control criteria, Massachusetts Department of Environmental Protection, Revision 1.1 (2004). Also the general validation guidelines promulgated by the USEPA Hazardous Wastes Support Section. The QC criteria and data validation actions listed on the data review worksheets are from the primary guidance document, unless otherwise noted.

Results are valid and can be used for decision making purposes.

Critical issues: **None**
Major: **None**
Minor: **None**

Critical findings: **None**
Major findings: **None**
Minor findings:

1. Continuing and final calibration verification meets method specific requirements except in the cases described in this document. The % difference for EPH in the C11-C22 (Aromatics) retention time window in the continuing and ending calibration verification was outside the method performance criteria. Results are qualified as estimated in affected samples.

2. 1-chlorooctadecane recovered outside the laboratory control limits in samples MC49177-1 to -9; and -12. Outside control limits due to possible matrix interference. Confirmed by refractionation/reanalysis. No action taken.

3. C9-C18 aliphatics LCS/LCS % recovery RPD outside laboratory control limits. Recovery of n-nonane was <30% for the laboratory control simple. No action taken, professional judgment.

COMMENTS: Results are valid and can be used for decision making purposes.

Reviewers Name: Rafael Infante
Chemist License 1888

Signature: 

Date: January 21, 2017

SAMPLE ORGANIC DATA SAMPLE SUMMARY

Sample ID: MC49177-1
Sample location: BMSMC Building 5 Area
Sampling date: 12/13/2016
Matrix: Groundwater

METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	49.8	ug/L	1	J	J	Yes
Ç9 - C18 Aliphatics	110	ug/L	1	-	-	Yes
Ç19 - C36 Aliphatics	71.8	ug/L	1	J	J	Yes
Ç11 - C22 Aromatics	48.8	ug/L	1	J	J	Yes

Sample ID: MC49177-2
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: AQ - Equipment Blank

METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	110	ug/L	1	-	UJ	Yes
Ç9 - C18 Aliphatics	110	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	110	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	110	ug/L	1	-	UJ	Yes

Sample ID: MC49177-3
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: Groundwater
METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	41.1	ug/L	1	J	J	Yes
Ç9 - C18 Aliphatics	110	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	110	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	40.4	ug/L	1	J	J	Yes

Sample ID: MC49177-4
Sample location: BMSMC Building 5 Area
Sampling date: 12/13/2016
Matrix: AQ -Field Blank Water
METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	110	ug/L	1	-	UJ	Yes
Ç9 - C18 Aliphatics	110	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	110	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	110	ug/L	1	-	UJ	Yes

Sample ID: MC49177-5
Sample location: BMSMC Building 5 Area
Sampling date: 12/15/2016
Matrix: Groundwater
METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	80.6	ug/L	1	J	J	Yes
Ç9 - C18 Aliphatics	110	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	110	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	77.7	ug/L	1	J	J	Yes

Sample ID: MC49177-6
Sample location: BMSMC Building 5 Area
Sampling date: 12/15/2016
Matrix: Groundwater
METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	57.3	ug/L	1	J	J	Yes
Ç9 - C18 Aliphatics	110	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	31.3	ug/L	1	J	J	Yes
Ç11 - C22 Aromatics	57.3	ug/L	1	J	J	Yes

Sample ID: MC49177-7
Sample location: BMSMC Building 5 Area
Sampling date: 12/13/2016
Matrix: Groundwater
METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	98.2	ug/L	1	J	J	Yes
Ç9 - C18 Aliphatics	100	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	63.5	ug/L	1	J	J	Yes

Sample ID: MC49177-8
Sample location: BMSMC Building 5 Area
Sampling date: 12/13/2016
Matrix: Groundwater
METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	36.6	ug/L	1	J	J	Yes
Ç9 - C18 Aliphatics	100	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	35.6	ug/L	1	J	J	Yes

Sample ID: MC49177-9
Sample location: BMSMC Building 5 Area
Sampling date: 12/13/2016
Matrix: Groundwater
METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	38.7	ug/L	1	J	J	Yes
Ç9 - C18 Aliphatics	100	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	37.7	ug/L	1	J	J	Yes

Sample ID: MC49177-10
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: Groundwater
METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	39.3	ug/L	1	J	J	Yes
Ç9 - C18 Aliphatics	100	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	38.9	ug/L	1	J	J	Yes

Sample ID: MC49177-11
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: Groundwater
METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	72.5	ug/L	1	J	J	Yes
Ç9 - C18 Aliphatics	100	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	71.1	ug/L	1	J	J	Yes

Sample ID: MC49177-12
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: AQ - Field Blank Water
METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	110	ug/L	1	-	UJ	Yes
Ç9 - C18 Aliphatics	110	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	110	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	100	ug/L	1	-	UJ	Yes

Sample ID: MC49177-13
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: Groundwater
METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	48.7	ug/L	1	J	J	Yes
Ç9 - C18 Aliphatics	110	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	110	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	48.0	ug/L	1	J	UJ	Yes

Sample ID: MC49177-14
Sample location: BMSMC Building 5 Area
Sampling date: 12/15/2016
Matrix: AQ - Equipment Blank
METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	100	ug/L	1	-	UJ	Yes
Ç9 - C18 Aliphatics	100	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	100	ug/L	1	-	UJ	Yes

Sample ID: MC49177-3MS
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: Groundwater

METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	870	ug/L	1	-	J	Yes
Ç9 - C18 Aliphatics	326	ug/L	1	-	-	Yes
Ç19 - C36 Aliphatics	435	ug/L	1	-	-	Yes

Sample ID: MC49177-3MSD
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: Groundwater

METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	726	ug/L	1	-	J	Yes
Ç9 - C18 Aliphatics	188	ug/L	1	-	-	Yes
Ç19 - C36 Aliphatics	375	ug/L	1	-	-	Yes

DATA REVIEW WORKSHEETS

Type of validation Full:__X____ Project Number:_MC49177_____
Limited:_____ Date:_____12/13-15/2016_____
Shipping date:__12/15/2016_____
EPA Region:_____2_____

REVIEW OF EXTRACTABLE PETROLEUM HYDROCARBON (EPHs) PACKAGE

The following guidelines for evaluating volatile organics were created to delineate required validation actions. This document will assist the reviewer in using professional judgment to make more informed decision and in better serving the needs of the data users. The sample results were assessed according to the data validation guidance documents in the following order of precedence METHOD FOR THE DETERMINATION OF EXTRACTABLE PETROLEUM HYDROCARBONS (VPH), Massachusetts Department of Environmental Protection, Revision 1.1 (2004). Also the general validation guidelines promulgated by the USEPA Hazardous Wastes Support Section. The QC criteria and data validation actions listed on the data review worksheets are from the primary guidance document, unless otherwise noted.

The hardcopied (laboratory name) _Accutest_Laboratories_____ data package received has been reviewed and the quality control and performance data summarized. The data review for SVOCs included:

Lab. Project/SDG No.: __MC49177_____ Sample matrix: ____Groundwater_____
No. of Samples: _____16_____
Field blank No.: _____MC49177-4;_MC49177-12_____
Equipment blank No.: _MC49177-2;_MC49177-14_____
Trip blank No.: _____-_____
Field duplicate No.: _____MC49177-8/MC49177-9_____

__X____ Data Completeness
__X____ Holding Times
__N/A__ GC/MS Tuning
__N/A__ Internal Standard Performance
__X____ Blanks
__X____ Surrogate Recoveries
__X____ Matrix Spike/Matrix Spike Duplicate
___X__ Laboratory Control Spikes
___X__ Field Duplicates
___X__ Calibrations
___X__ Compound Identifications
___X__ Compound Quantitation
___X__ Quantitation Limits

Overall Comments:
_Extractable_Petroleum_Hydrocarbons_by_GC_by_Method_MADEP_EPH,_REV_1.1._____
_____
_____

Definition of Qualifiers:

J- Estimated results
U- Compound not detected
R- Rejected data
UJ- Estimated nondetect

Reviewer: Rafael Delaut
Date:_____January_20,_2017_____

All criteria were met __x___
Criteria were not met and/or see below _____

I. DATA COMPLETNESS
A. Data Package:

MISSING INFORMATION DATE LAB. CONTACTED DATE RECEIVED

B. Other Discrepancies:

All criteria were met ___X___
Criteria were not met and/or see below _____

HOLDING TIMES
The objective of this parameter is to ascertain the validity of the results based on the holding time of the sample from time of collection to the time of extraction, and subsequently from the time of extraction to the time of analysis.

Complete table for all samples and note the analysis and/or preservation not within criteria

SAMPLE ID	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	ACTION
Samples extracted and analyzed within method recommended holding time				

Criteria

Preservation:

Aqueous samples must be acidified to a pH of 2.0 or less at the time of collection.
Soil samples must be cooled at 4 ± 2 °C immediately after collection.

Holding times:

Samples must be extracted within 14 days of collection, and analyzed within 40 days of extraction.

Cooler temperature (Criteria: 4 ± 2 °C):___3.9°C_____

Actions: Qualify positive results/nondetects as follows:

If holding times are exceeded, estimate positive results (J) and nondetects (UJ).
If holding times are grossly exceeded, use professional judgment to qualify data. The data reviewer may choose to estimate positive results (J) and rejects nondetects (R).
If samples were not at the proper temperature (> 10°C) or improperly preserved, use professional judgment to qualify the results.

All criteria were met ___X___
Criteria were not met and/or see below _____

CALIBRATIONS VERIFICATION

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data.

Date of initial calibration:_____12/06/16_____

Dates of initial calibration verification:_____12/06/16_____

Instrument ID numbers:_____GCDE_____

Matrix/Level:_____AQUEOUS/MEDIUM_____

DATE	LAB FILE ID#	ANALYTE	CRITERIA OUT RFs, %RSD, %D, r	SAMPLES AFFECTED
Initial and continuing calibration meet method specific requirements				

Criteria- ICAL

- Five point calibration curve.
- The percent relative standard deviation (%RSD) of the calibration factor must be equal to or less than 25% over the working range for the analyte of interest. When this condition is met, linearity through the origin may be assumed, and the average calibration factor is used in lieu of a calibration curve.
- A collective calibration factor must also be established for each hydrocarbon range of interest. Calculate the collective CFs for C9-C18 Aliphatic Hydrocarbons, C19-C36 Aliphatic Hydrocarbons, and C11-C22 Aromatic Hydrocarbons using the FID chromatogram. Tabulate the summation of the peak areas of all components in that fraction against the total concentration injected. The %RSD of the calibration factor must be equal to or less than 25% over the working range for the hydrocarbon range of interest.
    - The area for the surrogates must be subtracted from the area summation of the range in which they elute.
    - The areas associated with naphthalene and 2-methylnaphthalene in the aliphatic range standard must be subtracted from the uncorrected collective C9-C18 Aliphatic Hydrocarbon range area prior to calculating the CF.

Criteria- CCAL

- At a minimum, the working calibration factor must be verified on each working day, after every 20 samples or every 24 hours (whichever is more frequent), and

at the end of the analytical sequence by the injection of a mid-level continuing calibration standard to verify instrument performance and linearity.

- If the percent difference (%D) for any analyte varies from the predicted response by more than ±25%, a new five-point calibration must be performed for that analyte. Greater percent differences are permissible for n-nonane. If the %D for n-nonane is greater than 30, note the nonconformance in the case narrative. It should be noted that the %Ds are calculated when CFs are used for the initial calibration and percent drifts are calculated when calibration curves using linear regression are used for the initial calibration.

Actions:

If %RSD > 25% for target compounds or a correlation coefficient < 0.99, estimate positive results (J) and use professional judgment to qualify nondetects.
If % D > 25% (> 30 for nonane), estimate positive results (J) and nondetects (UJ).

CALIBRATIONS VERIFICATION

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data.

Date of initial calibration:_____12/06/16_____

Dates of continuing calibration verification:___12/28/16;_12/29/16;_01/03/17____

Dates of final calibration verification:_12/06/16;_12/29/16;_12/29/16;_01/03/17__

Instrument ID numbers:_____GCDE_____

Matrix/Level:_SOIL/AQUEOUS/MEDIUM_____

DATE	LAB FILE ID#	ANALYTE	CRITERIA OUT RFs, %RSD, **%D**, r	SAMPLES AFFECTED
Initial and continuing calibration meets method specific requirements except for the cases described in this document.				
12/29/16	ecc908-50	C11-C22 Aromatics	99.1	QC samples
12/29/16	cc908-50	C11-C22 Aromatics	99.1	MC49177-1 to -10
12/29/16	cc908-50	C11-C22 Aromatics	99.1	MC49177-11 to -14
12/29/16	cc908-50	C11-C22 Aromatics	99.1	MC49177-11 to -14

Note: Results qualified as estimated (J or UJ) in affected samples.

A separate worksheet should be filled for each initial curve

All criteria were met ___X___
Criteria were not met and/or see below _____

V A. BLANK ANALYSIS RESULTS (Sections 1 & 2)

The assessment of the blank analysis results is to determine the existence and magnitude of contamination problems. The criteria for evaluation of blanks apply only to blanks associated with the samples, including trip, equipment, and laboratory blanks. If problems with any blanks exist, all data associated with the case must be carefully evaluated to determine whether or not there is an inherent variability in the data for the case, or if the problem is an isolated occurrence not affecting other data. A Laboratory Method Blank must be run after samples suspected of being highly contaminated to determine if sample carryover has occurred.

List the contamination in the blanks below. High and low levels blanks must be treated separately.

Laboratory blanks

DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS

__METHOD BLANKS MEET THE METHOD SPECIFIC CRITERIA_____

Field/Trip/**Equipment**

DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS

_NO_TARGET_ANALYTES_DETECTED_IN_THE_FIELD/EQUIPMENT_BLANK_____
_ANALYZED_FOR_THIS_DATA_PACKAGE._____

All criteria were met __X___
Criteria were not met and/or see below _____

V B. BLANK ANALYSIS RESULTS (Section 3)

Blank Actions

The ALs for samples which have been diluted should be corrected for the sample dilution factor and/or % moisture, where applicable. Peaks must not be detected above the Reporting Limit within the retention time window of any analyte of interest. The hydrocarbon ranges must not be detected at a concentration greater than 10% of the most stringent MCP cleanup standard. Specific actions area as follows:

If the concentration is < sample quantitation limit (SQL) and < AL, report the compound as not detected (U) at the SQL.
If the concentration is ≥ SQL but < AL, report the compound as not detected (U) at the reported concentration.
If the concentration is > AL, report the concentration unqualified.

All criteria were met __X___
Criteria were not met and/or see below _____

SURROGATE SPIKE RECOVERIES

Laboratory performance of individual samples is established by evaluation of surrogate spike recoveries. All samples are spiked with surrogate compounds prior to sample analysis. The accuracy of the analysis is measured by the surrogate percent recovery. Since the effects of the sample matrix are frequently outside the control of the laboratory and may present relatively unique problems, the validation of data is frequently subjective and demands analytical experience and professional judgment.
List the percent recoveries (%Rs) which do not meet the criteria for surrogate recovery.
Matrix: solid/aqueous

SAMPLE ID	**SURROGATE COMPOUND**				**ACTION**
	S1	S2	S3	S4	

_SURROGATE_STANDARDS_RECOVERIES_WITHIN_LABORATORY_CONTROL__
_LIMITS_EXCEPT_IN_THE_CASES_DESCRIBED_IN_THIS_DOCUMENT._____

Note: 1-chlorooctadecane recovered outside the laboratory control limits in samples MC49177-1 to -9; and -12. Outside control limits due to possible matrix interference. Confirmed by refractionation/reanalysis. No action taken.

S1 = o-Terphenyl 40-140% S2 = 2-Fluorobiphenyl 40-140%
S3 = 1-Chlorooctadecane 40-140% S4 = 2-Bromonaphthalene 40-140%

QC Limits (%)* (Aqueous)
_LL_to_UL_ _40_to_140_ _40_to_140_ _40_to_140_ _40_to_140_
QC Limits* (Solid)
_LL_to_UL_ ___to___ ____to_____ ___to_____ ___to_____

It is recommended that surrogate standard recoveries be monitored and documented on a continuing basis. At a minimum, when surrogate recovery from a sample, blank, or QC sample is less than 40% or more than 140%, check calculations to locate possible errors, check the fortifying standard solution for degradation, and check changes in instrument performance.

If the cause cannot be determined, reanalyze the sample unless one of the following exceptions applies:

(1) Obvious interference is present on the chromatogram (e.g., unresolved complex mixture);
(2) The surrogate exhibits high recovery and associated target analytes or hydrocarbon ranges are not detected in sample.

If a sample with a surrogate recovery outside of the acceptable range is not reanalyzed based on any of these aforementioned exceptions, this information must be noted on the data report form and discussed in the Executive Report. Analysis of the sample on dilution may diminish matrix-related surrogate recovery problems. This approach can be used as long as the reporting limits to evaluate applicable MCP standards can still be achieved with the dilution. If not, reanalysis without dilution must be performed.

All criteria were met _X____
Criteria were not met and/or see below _____

VII. A MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD)

This data is generated to determine long term precision and accuracy in the analytical method for various matrices. This data alone cannot be used to evaluate the precision and accuracy of individual samples.

At the request of the data user, and in consideration of sample matrices and data quality objectives, matrix spikes and matrix duplicates may be analyzed with every batch of 20 samples or less per matrix.

- **Matrix duplicate** - Matrix duplicates are prepared by analyzing one sample in duplicate. The purpose of the matrix duplicates is to determine the homogeneity of the sample matrix as well as analytical precision. The RPD of detected results in the matrix duplicate samples must not exceed 50 when the results are greater than 5x the reporting limit.
- The desired spiking level is 50% of the highest calibration standard. However, the total concentration in the MS (including the MS and native concentration in the unspiked sample) should not exceed 75% of the highest calibration standard in order for a proper evaluation to be performed. The purpose of the matrix spike is to determine whether the sample matrix contributes bias to the analytical results. The corrected concentrations of each analyte within the matrix spiking solution must be within 40 - 140% of the true value. Lower recoveries of n-nonane are permissible but must be noted in the narrative if <30%.

MS/MSD Recoveries and Precision Criteria

Sample ID:_MC49177-3_MS/MSD_____ Matrix/Level:__Groundwater_____

List the %Rs, RPD of the compounds which do not meet the QC criteria.

MS OR MSD	COMPOUND	% R	RPD	QC LIMITS	ACTION

Note: MS/MSD and RPD within laboratory control limits.

All criteria were met __X___
Criteria were not met and/or see below _____

No action is taken on MS/MSD results alone to qualify the entire case. However, used informed professional judgment, the data reviewer may use the MS/MSD results in conjunction with other QC criteria and determine the need for some qualification of the data. In those instances where it can be determined that the results of the MS/MSD affect only the sample spiked, the qualification should be limited to this sample alone. However, it may be determined through the MS/MSD results that the laboratory is having a systematic problem in the analysis of one or more analytes, which affects the associated samples.

2. MS/MSD – Unspiked Compounds

List the concentrations of the unspiked compounds and determine the % RSDs of these compounds in the unspiked sample, matrix spike, and matrix spike duplicate.

COMPOUND	CONCENTRATION SAMPLE	MS	MSD	%RPD	ACTION

Criteria: None specified, use %RSD $\leq$ 50 as professional judgment.

Actions:

If the % RSD > 50, qualify the results in the spiked sample as estimate (J).
If the % RSD is not calculable (NC) due to nondetect value in the sample, MS, and/or MSD, use professional judgment to qualify sample data.

A separate worksheet should be used for each MS/MSD pair.

All criteria were met __X___
Criteria were not met and/or see below _____

VIII. LABORATORY CONTROL SAMPLE (LCS/LCSD) ANALYSIS

This data is generated to determine accuracy of the analytical method for various matrices.

1. LCS Recoveries Criteria

List the %R of compounds which do not meet the criteria

LCS ID	COMPOUND	% R	QC LIMIT	ACTION

_LCS/LCSD_RECOVERY_WITHIN_LABORATORY_CONTROL_LIMTS_EXCET_FOR_
_THE_CASES_DESCRIBED_IN_THIS_DOCUMENT._____

Note: C9-C18 aliphatics LCS/LCS % recovery RPD outside laboratory control limits. Recovery of n-nonane was <30% for the laboratory control simple. No action taken, professional judgment.

Criteria:
* Refer to QAPP for specific criteria.
* The spike recovery must be between 40% and 140%. Lower recoveries of n-nonane are permissible. If the recovery of n-nonane is <30%, note the nonconformance in the executive narrative. RPD between LCS/LCSD must be < 25%.

Actions:
Actions on LCS recovery should be based on both the number of compounds that are outside the %R and RPD criteria and the magnitude of the excedance of the criteria.

If the %R of the analyte is > UL, qualify all positive results (j) for the affected analyte in the associated samples and accept nondetects.
If the %R of the analyte is < LL, qualify all positive results (j) and reject (R) nondetects for the affected analyte in the associated samples.
If more than half the compounds in the LCS are not within the required recovery criteria, qualify all positive results as (J) and reject nondetects (R) for all target analyte(s) in the associated samples.

2. Frequency Criteria:

Where LCS analyzed at the required frequency and for each matrix (1 per 20 samples per matrix)? **Yes** or No.
If no, the data may be affected. Use professional judgment to determine the severity of the effect and qualify data accordingly. Discuss any actions below and list the samples affected. Discuss the actions below:

All criteria were met __X___
Criteria were not met and/or see below _____

IX. FIELD/LABORATORY DUPLICATE PRECISION

Sample IDs: __MC49177-8/MC49177-9_____ Matrix:__Groundwater__

Field/laboratory duplicates samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than laboratory duplicates which measures only laboratory performance. It is also expected that soil duplicate results will have a greater variance than water matrices due to difficulties associated with collecting identical field duplicate samples.

COMPOUND	SQL	SAMPLE CONC.	DUPLICATE CONC.	RPD	ACTION
Field duplicate analyzed with this data package. RPD within laboratory and generally acceptable control limits					

Criteria:

The project QAPP should be reviewed for project-specific information.
RPD $\pm$ 30% for aqueous samples, RPD $\pm$ 50 % for solid samples if results are $\geq$ SQL.
If both samples and duplicate are <5 SQL, the RPD criteria is doubled.

SQL = soil quantitation limit

Actions:

If both the sample and the duplicate results are nondetects (ND), the RPD is not calculable (NC). No action is needed.

Qualify as estimated positive results (J) and nondetects (UJ) for the compound that exceeded the above criteria.

If one sample result is not detected and the other is $\geq$ 5x the SQL qualify (J/UJ).

Note: If SQLs for the sample and duplicate are significantly different, use professional judgment to determine if qualification is appropriate.

If one sample value is not detected and the other is < 5x the SQL, use professional judgment to determine if qualification is appropriate.

All criteria were met __X___
Criteria were not met and/or see below _____

XI. COMPOUND IDENTIFICATION

The compound identification evaluation is to verify that the laboratory correctly identified target analytes as well as tentatively identified compounds (TICs).

1. Verify that the target analytes were within the retention time windows.

   - Retention time windows must be re-established for each Target EPH Analyte each time a new GC column is installed, and must be verified and/or adjusted on a daily basis.
   - The n-nonane (n-C9) peak must be adequately resolved from the solvent front of the chromatographic run.
   - All surrogates must be adequately resolved from the Aliphatic Hydrocarbon and Aromatic Hydrocarbon standards.
   - For the purposes of this method, adequate resolution is assumed to be achieved if the height of the valley between two peaks is less than 25% of the average height of the two peaks.
   - The n-pentane (C5) and MtBE peaks must be adequately resolved from any solvent front that may be present on the FID and PID chromatograms, respectively.

1a. Aliphatic hydrocarbons range:

   - Determine the total area count for all peaks eluting 0.1 minutes before the retention time (Rt) for n-C9 and 0.01 minutes before the Rt for n-C19.
   - Determine the total area count for all peaks eluting 0.01 minutes before the Rt for n-C19 and 0.1 minutes after the Rt for n-C36.

Are the aliphatic hydrocarbons range properly determined? **Yes**? or No?

Comments:

1b. Aromatic hydrocarbons range:

   - Determine the total area count for all peaks eluting 0.1 minutes before the retention time (Rt) for naphthalene and 0.1 minutes after the Rt for benzo(g,h,i)perylene.
   - Determine the peak area count for the sample surrogate (OTP) and fractionation surrogate(s). Subtract these values from the collective area count value.

Are the aliphatic hydrocarbons range properly determined? **Yes**? or No?

Comments:

All criteria were met __X___
Criteria were not met and/or see below _____

2. If target analytes and/or TICs were not correctly identified, request that the laboratory resubmit the corrected data.

3. Breakthrough determination - Each sample (field and QC sample) must be evaluated for potential breakthrough on a sample specific basis by evaluating the % recovery of the fractionation surrogate (2-bromonaphthalene) and on a batch basis by quantifying naphthalene and 2-methylnaphthalene in both the aliphatic and aromatic fractions of the LCS and LCSD. **If either the concentration of naphthalene or 2-methylnaphthalene in the aliphatic fraction exceeds 5% of the total concentration for naphthalene or 2-methylnaphthalene in the LCS or LCSD, fractionation must be repeated on all archived batch extracts.**

NOTE: **The total concentration of naphthalene or 2-methylnaphthalene in the LCS/LCSD pair includes the summation of the concentration detected in the aliphatic fraction and the concentration detected in the aromatic fraction.**

Comments:__Concentration_in_the_aliphatic_fraction_<_5%_of_the_total_____
_concentration_for_naphthalene_and_2-methylnaphthalene_____
_____
_____
_____

4. **Fractionation Check Standard** – A fractionation check solution is prepared containing 14 alkanes and 17 PAHs at a nominal concentration of 200 ng/µl of each constituent. The Fractionation Check Solution must be used to evaluate the fractionation efficiency of each new lot of silica gel/cartridges, and establish the optimum hexane volume required to efficiently elute aliphatic hydrocarbons while not allowing significant aromatic hydrocarbon breakthrough. For each analyte contained in the fractionation check solution, excluding n-nonane, the Percent Recovery must be between 40 and 140%. A 30% Recovery is acceptable for n-nonane.

Is a fractionation check standard analyzed? Yes? or No?

Comments: Not applicable.

All criteria were met __X___
Criteria were not met and/or see below _____

XII. QUANTITATION LIMITS AND SAMPLE RESULTS

The sample quantitation evaluation is to verify laboratory quantitation results.

In order to demonstrate the absence of aliphatic mass discrimination, the response ratio of C28 to C20 must be at least 0.85. If <0.85, this nonconformance must be noted in the laboratory case narrative.

The chromatograms of Continuing Calibration Standards for aromatics must be reviewed to ensure that there are no obvious signs of mass discrimination.

Is aliphatic mass discrimination observed in the sample? Yes? or **No**?

Is aromatic mass discrimination observed in the sample? Yes? or **No**?

1. In the space below, please show a minimum of one sample calculation:

MC49177-1 EPH (C11 – C22, Aromatics) RF = 99940

[ ] = (2313350)/(99940)

[ ] = 23.14 ppb Ok

EPH (C19 - C36, Aliphatics) RF = 67800

[ ] = (2264689)/(67800)

[ ] = 33.40 ppb Ok

2. If requested, verify that the results were above the laboratory method detection limit (MDLs).

3. If dilutions performed, were the SQLs elevated accordingly by the laboratory? List the affected samples and dilution factor in the table below.

SAMPLE ID	DILUTION FACTOR	REASON FOR DILUTION

If dilution was not performed, estimate results (J) for the affected compounds. List the affected samples/compounds:

_____

_____